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James Stirling, Esq., F.G.S., F.L.S., F.G.S.A., etc., etc.

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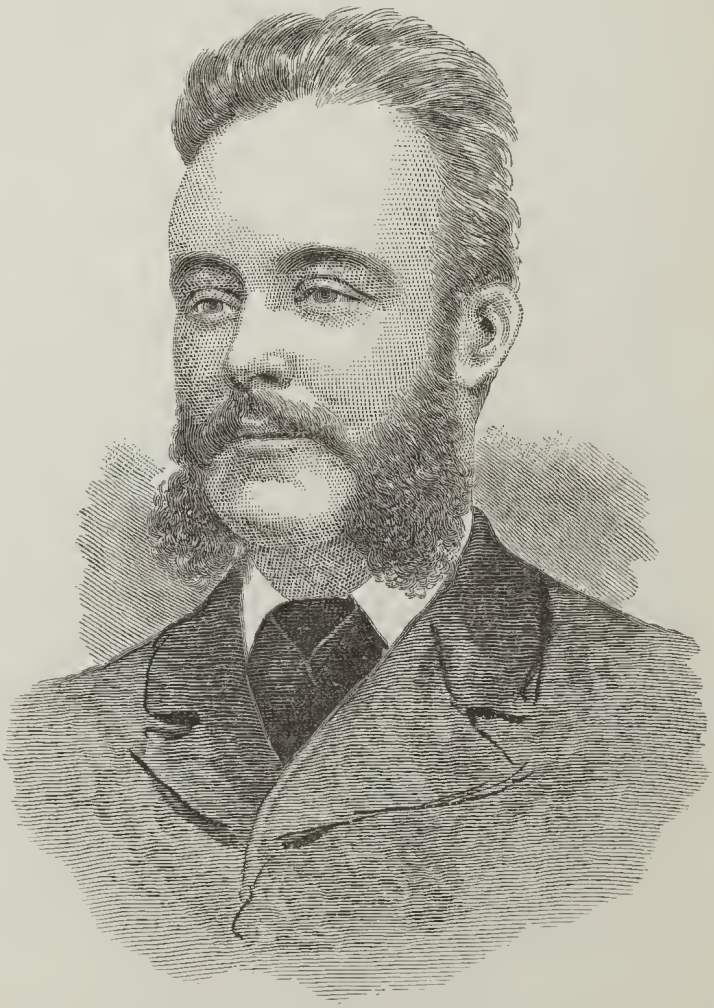

JAMES STIRLING, ESQ.,

F.G.S., F.L.S., F.G.S.A., F.B.S.A., ETC., ETC.

THE

AUSTRALASIAN SCIENTIFIC MAGAZINE.

No. III. OCTOBER 1, 1885. Vol. I.

OUR PORTRAIT AND BIOGRAPHICAL GALLERY.

JAMES STIRLING, F.G.S., F.L.S., F.G.S.A., F.B.S.A., Etc., Etc.

"A son of the soil"
"A self-made man."

We select for our first portrait that of Mr. Stirling, inasmuch as he is the first native-born contributor to our columns who has achieved for himself a position in the world of science. His life will show to young Australia what indomitable perseverance in the face of many drawbacks may be accomplished, and be an example for the imitation of others, with far greater advantages in their favour than he ever enjoyed.

Born in Geelong early in 1852, the son of an estimable merchant and prominent citizen, he was by the premature death of his father, thrown on the world, to push his way as best he could. School craft in these colonies in those early days was not what it is now. But it appears that his father obtained for him during some fourteen years of his early life as good education as was obtainable at that time. Thus placed, and having to look around for himself, he went into the service of relatives who owned squatting estates in the Gippsland district. There he seems to have remained for about two years of vegetation, in which period most youngsters would have forgotten the smattering of education they had gained in their earlier infancy. Not so with young Stirling. By study and intellectual development, he soon found that bucolic indolence was not for

him. And he developed a taste for art, and having a free pencil, and a bent towards sculpture and architecture, he served a time with a monumental mason. But as "*necessitas non habet leges*," he was compelled to take paying work at the Alfred Graving Dock, at Williamstown, then in course of construction. This, however, he had to relinquish, as the constant inhalation of the fine dust from the hewing and cutting and smoothing of stone brought on lung disease. During this period Mr. Stirling seems to have been a constant student. Certain it is that he was a regular attendant at the Artisans' School of Design at the then infant Trades' Hall of Melbourne.

When sufficiently restored to health, he entered for a time the service of a leading firm of architects as a draftsman, and in 1873, when barely arrived at statutory manhood, he entered upon responsible duties in the Crown Lands Department of Victoria, in Melbourne; and before long, when a branch of the Survey Office was established at Omeo, he was appointed in connexion with the triangulation survey of the district. This developed his latent passion for physiographical studies, which he has ever since pursued.

The outcome of Mr. Stirling's talent and perseverance is shown in numerous papers he has contributed from time to time to scientific institutions and journals, and the honours which he has gained through them.

Since 1876 Mr. Stirling's steps in the thorny paths of science have been eased by the unremitting aid of his accomplished wife.

R. T.

DESCRIPTIVE NOTES ON PAPUAN PLANTS.

BY

BARON FERD. VON MUELLER, K.C.M.G., M. & PH.D., F.R.S., ETC. ETC.

PART II.

APOCYNEÆ

TABERNÆMONTANA AURANTIACA.
Gaudichaud in Freyc. voy. 50 et 55, t. 61.

Fly River; D'Albertis.
Identified by Dr. Beccari.

ACANTHACEÆ.

ERANTHEMUM VARIABILE.
R. Brown, prodr. 447.

Lorne Range; Capt. Bridge.

BIGNONIACEÆ.

DOLICHANDRONE RHEEDEI.
Seemann, journ. of Bot. viii. 380 (1870).
Near Astrolabe Range; E. G. Edelfelt.

GESNERIACEÆ.

ÆSCHYNANTHUS ARFAKENSIS.
C. B. Clarke in A. and C. de Cand. monogr. phaner. v. 36.
Mount Arfak; Dr. Beccari.

ÆSCHYNANTHUS TUBIFLORUS.
Clarke, l. c. 36.
Ausys; Beccari.

ÆSCHYNANTHUS LEPTOCLADUS.
Clarke, l. c. 39.
Mount Arfak, 6000 feet; Beccari.

ÆSCHYNANTHUS PODOCARPUS.
Clarke, l. c. 40.
Fly River; D'Albertis.

ÆSCHYNANTHUS VERTICILLATUS.
Clarke, l. c. 40.
Fly River; D'Albertis.
Only foliage known; the generical position suggested by the author of the present work.

ÆSCHYNANTHUS MICROTRICHUS.
Clarke, l. c. 51, t. iii.
Mount Arfak, 6000 feet; Beccari.

DICHROTRICHUM CHALMERSII.
F. v. M. in Melb. Chemist, June 1884.
Owen Stanley's Range; Rev. James Chalmers.

DICHROTRICHUM BREVIPES.
Clarke, l. c., t. iv.
Mount Arfak; Beccari.

BÆA TREUBEI.
Forbes in Journ. Linn. Soc. xix. 297.
Astrolabe Range; Rev. W. G. Lawes.

In absence of fruit this showy plant was referred by me to Didymocarpus (Wing's South. Sc. Rec. Oct. 1882), but the likelihood of a transfer to Bæa being required was then already indicated.

BÆA URVILLEI.
Clarke, l. c. 147.
Island Waigiou; Admiral D'Urville.

EPITHEMA BENTHAMI.
Clarke, l. c. 180.
Mount Arfak; Beccari.

CYRTANDRA DECURRENS.
De Vriese, pl. Ind. Batav. Reinw. 14.
Andai; Dr. Beccari.
Identified by Mr. Clarke.

CYRTANDRA CALYCINA.
Bentham in Hook. Lond. journ. ii, 229.
New Guinea; Hinds, Zippel;—at Ramoi; Beccari.

CYRTANDRA HAPALANTHA.
Clarke, l. c. 252.

At Ramoi: Beccari.

CYRTANDRA LIGULIFERA.
Clarke, l. c. 252.

At Andai and also on Mount Arfak; Beccari.

CYRTANDRA ALBERTISII.
Clarke, l. c. 254.

Fly River; D'Albertis.

SOLANACEÆ.

PHYSALIS MINIMA.

Murray Island; Rev. J. Chalmers. Aroa River, W. Armit.

LOGANIACEÆ.

BUDDLEYA ASIATICA.
Loureiro, fl. Cochinchin. 72.

Aroa River; W. Armit.
The small-flowered variety.

CONVOLVULACEÆ.

IPOMŒA ERECTA.
R. Brown, prodr. 487.

Jervis Island; Rev. J. Chalmers.

EVOLVULUS LINIFOLIUS.
Linné, sp. pl. sec. edit. 392.

Murray Island; Rev. J. Chalmers.

LABIATÆ.

COLEUS SCUTELLAROIDES.
Bentham in Wall. pl. Asiat. rarior. ii. 16.

Near Port Moresby; Rev. James Chalmers.

CYCADEÆ.

CYCAS SCRATCHLEYANA.
F. v. M. in Vict. Naturalist, Apr. 1885.

Mount Bedford, Jala River, W. Armit.

ORCHIDEÆ.

DENDROBIUM CINCINNATUM.
F. v. M. in proc. Roy. Soc. Queensl. i. part 3 (1884).

South-Eastern New Guinea. Described from a cultivated specimen, received through F. M. Bailey, Esq., F.L.S., from the bot. Garden of Brisbane.

DENDROBIUM CHALMERSII.
F. v. M. in Wing's S. Sc. Record, May 1882.

North-Eastern New Guinea; Rev. J. Chalmers.

DENDROBIUM ALBERTISII.
G. Reichenbach in D'Albertis's New Guinea, 399.

Fly River; D'Albertis.

DENDROBIUM LAWESII.
F. v. M. in Melb. Chemist, June 1884.

Owen Stanley's Ranges; Rev. J. Chalmers.
It is allied to D. trichostomum, G. Reichenb. in Linnæa, 1876, p. 46.

DENDROBIUM JOHNSONIÆ.
F. v. M. in Wing's Southern Science Record, May 1882.

South-Eastern New Guinea; Rev. James Chalmers.

From access to more specimens I can now furnish some additional notes on this superb species, which meanwhile has also found its way into conservatory-cultivation.

Root emitting elongated flexuous strong fibres; stem erect, from eight inches to much higher, attenuated at the base, gradually thickened towards the middle and also to some extent upwards, contracted again at the summit, consisting of several joints, cylindrical, conspicuously furrowed, in small specimens only about ½ an inch wide at the thickest part, in larger specimens considerably stouter. Leaves few, terminal, almost ovate or lanceolate-ovate, 2-4 inches long, thickly chartaceous, slightly keeled. Racemes infra-terminal, bearing few or several flowers; peduncle rather slender. Gynostemium minutely two-horned. Another operculate, blunt, ending in a depressed callus. Pollen masses of waxy consistence, yellow, erect, connate in two pairs, these again coherent, each of the constituting bodies being dimidiate-globular. The characteristics of the anther could only be observed on a solitary flower; hence further observations are to be instituted, whether the structure thus far points really to Dendrobium, the other floral characteristics reminding of Phalænopsis. It is, however, cognate to D. Sumneri (F. v. M. fr. vi. 94) and D. Phalænopsis (Fitzg. in Gardn. Chron. 1883, p. 38; Austral. Orch. part 7.); of the latter also an excellent representation is given in the Bot. Mag. May 1885, where the great work on Austr. Orchids is referred to as "a *solitary* example of an illustrated bot. publication of a high order of merit emanating from a British Colony," a sentence *not just* to science in other dominions of the British Colonial Empire.

Dendrobium bifalce, mentioned already in this work I. p. 14, has been already (1862) transferred to the genus Doritis (near Phalænopsis) by the great orchidographer, Dr. G. Reichenbach in his Xenia ii. 7. To Doritis belongs also (as D. paniculata) the Carteretia paniculata (Ach. Rich. sert. Astrolabe p. 10, t. 4); conf. B. & H. gen. pl. III, 574; to the same species should likewise be joined Saccolabium quinquefidum, Lindley in Hook. Lond. journ. 11, 238.—Dendrobium arachnostachyum, G. Reichenbach in the Gardeners' Chronicle 1877, p. 334, may also prove a Papuan species.

CLEISOSTOMA CRYPTOCHILUM.
F. v. M. in Wing's S. Sc. Record, May 1885.
Astrolabe Ranges; G. Belford.

APPENDICULA CHALMERSIANA.
F. v. M. in Wing's S. Sc. Record, May 1885.
Astrolabe Ranges; Rev. James Chalmers.

PHOLIDOTA IMBRICATA.
Lindley in Hook. exot. Flor. ii. t. 138.
Jala River; W. Armit.

SCITAMINÆ.

CLINOGYNE DICHOTOMA.
Salisbury in transact. hort. soc. of London i. 276.
Fly River; D'Albertis; according to Dr. Beccari, who quotes this plant under Wallich's and Dietrich's appellation as Maranta dichotoma.

AMARYLLIDEÆ.

HYPOXIS HYGREMETRICA.
Labillardière, Nov. Hall. plant. spec. i. 82, t. 108.
Near Port Moresby; Rev. W. G. Lawes.

LILIACEÆ.

DIANELLA ENSIFOLIA.

De Candolle and Redouté Liliaceæ, t. 1.

Cloudy Mountains, Lorne Range; Capt. Bridge.

ARTHROPODIUM STRICTUM.

R. Brown, prodr. 276.

Near Port Moresby; Rev. W. G. Lawes.

IPHIGENIA INDICA.

Kunth, enumer. plant. iv. 213.

Near Astrolabe Range; W. Armit.

COMMELYNEÆ.

ANEILEMA GIGANTEUM.

R. Brown, prodr. 271.

South-Eastern New Guinea; Rev. James Chalmers.

TACCACEÆ.

TACCA PINNATIFIDA.

R. and G. Forster, charact. gener. 69 t. 35.

South-Eastern New Guinea; Rev. James Chalmers.

PANDANEÆ.

FREYCINETIA INSIGNIS.

Blume, Rumphia, 158, t. 42.

Fly River; D'Albertis; according to Dr. Beccari.

AROIDEÆ.

PISTIA STRATIOTES.

Linné, spec. plant. 963.

South-Eastern New Guinea; Rev. James Chalmers.

RESTIACEÆ.

RESTIO PILISEPALUS.

Steudel, syn. glumac. ii. 256.

Island Waigiou; Admiral D'Urville.

Fruit unknown; genus therefore doubtful.

CYPERACEÆ.

FUIRENA UMBELLATA.

Rottboell, icon. et descript. rar. plant. 70, t. 19.

Aroa River; Armit.

GRAMINEÆ.

PANICUM SEMIALATUM.

R. Brown, prodr. 192.

Near the Laloki River; obtained during the Argus Expedition by Mr. W. Armit.

PANICUM BREVIFOLIUM.

Linné, spec. plant. 59.

Near the Laloki River; W. Armit.

PANICUM PLICATUM.

Lamarck, illustr. des genr. i. 171.

On the Laloki River; W. Armit.

ISACHNE AUSTRALIS.

R. Brown, prodr. 196.

Near Lorne Range; Rev. J. Chalmers.

PASPALUM MINUTIFLORUM.

Steudel, syn. glumac. i. 17.

On the Aroa River; W. Armit.

SETARIA GLAUCA.
Palisot, Agrostogr. 51, t. 13.
Near the Papuan Gulf; W. Armit. Near Port Moresby; Rev. W. G. Lawes.

PENNISETUM MACROSTACHYUM.
Trinius in Mém. de l'Acad. de St. Petersb. 6 sér. i. 177.
Cloudy Mountains; Capt. Bridge. Near the Aroa River; W. Armit.
This accords well with Bessa's delineation in the bot. Atlas to Duperrey's voyage t. 11, except that the styles are united below the stigmas.

STENOTAPHRUM SUBULATUM.
Trinius, Mém. de l'Ac. de St. Petersb. 6eme sér. i. 190.
Coast of New Guinea; Dr. Naumann.
Collected during the *Gazelle* voyage.

CHIONACHNE CYATHOPODA.
F. v. M. in Benth. fl. Austral. vii. 516
Cloudy Mountains; Capt. Bridge.

ELEUSINE INDICA.
Gærtner, de fructib. i. 7.
South-Eastern New Guinea; Armit (Argus Expedition).

IMPERATA ARUNDINACEA.
Cyrillo, plant. rar. Neopol. fasc. ii. 26.
South-Eastern New Guinea; Rev. James Chalmers. Especially at Bessel's Island; Capt. Bridge, R.N.

LYCOPODIACEÆ.

SELAGINELLA VICTORIÆ.
Moore in Gardener's Chron. 1879, p. 74.
Louisiade Archipelagus; Capt. Bridge.
Identified with the following by Mr J. G. Baker.

SELAGINELLA WALLICHII.
Spring, monograph. de la fam. des Lycop. ii. 143.
Astrolabe Range; Edelfelt.

SELAGINELLA MUELLERI.
Baker in Britten's journ. of Bot. xxiii. 122.
Near Port Moresby; Edelfelt. Mount Bedford; Armit.

SELAGINELLA LATIFOLIA.
Spring, monogr. ii. 168.
Astrolabe Range; Edelfelt.

LYCOPODIUM PINIFOLIUM.
Blume, enum. pl. Javan. 264.
Astrolabe Range; E. G. Edelfelt, who found there also L. squarrosum and Selaginella caulescens.

FILICES.

OPHIOGLOSSUM PENDULUM.
Linné, spec. plant. ed. alt. 1518.
Towards Owen Stanley's Range; Chalmers. Mount Bedford; Armit.
A furcated variety with the ordinary form.

LYGODIUM SCANDENT.
Swartz in Schrad. journ. ii. 106.
Jala River; Armit.

TRICHOMANES PALLIDUM.
Blume, enum, fil. Javan. 225.
Jala River; W. Armit.

TRICHOMANES JAVANICUM.
Blume, enum. filic. Javan. 224.
Mount Bedford; W. Armit.

ANGIOPTERIS EVECTA.
G. Hoffmann in comment. Goett. xii. 29.
Astrolabe Range; Edelfelt. Jala River; W. Armit.

MARATTIA FRAXINEA.
Smith, plant. icon. t. 48.
Mount Bedford; W. Armit. Astrolabe Range; E. G. Edelfelt.

CERATOPTERIS THALICTROIDES.
Brogniart in Bullet. de la Soc. philomat. 186.
Near Port Moresby; Rev. J. Chalmers.

LINDSAYA CONCINNA.
J. Smith in Hook. journ. iii. 415.
Mount Bedford; W. Armit. Obtained during the Argus Expedition with several of the other ferns here mentioned.

PTERIS GERANIFOLIA.
Raddi, syn. filic. Brasil. 46.
Mount Bedford; W. Armit. Astrolabe Range; E. G. Edelfelt.

TÆNITIS BLECHNOIDES.
Swartz, synops. filic. 24 et 220.
Mount Bedford; W. Armit.

ASPIDIUM ULIGINOSUM.
Kunze in Schlechtend. Linnæa xx. 6.
Near Port Moresby; Rev. J. Chalmers.

POLYPODIUM DIPTERIS.
Blume, enum. filic. Javan. 174, t, 81.
Aroa River; W. Armit.

POLYPODIUM ADNASCENS.
Swartz, synops. filic. 25 et 228.
Laloki River; W. Armit.

POLYPODIUM SUBDIGITATUM.
Blume, enum. fil. Jav. 196, t. 13.
Towards Port Moresby; Rev. J. Chalmers.

ACROSTICHUM REPANDUM.
Blume, fl. Javæ 39, t. 14 et 15.
Near South Cape; Capt. Bridge. Astrolabe Range; E. D. Edelfelt.

ACROSTICHUM SPICATUM.
Mount Bedford, at 3600 feet altitude; W. Armit.

Of evascular plants as yet a most scanty number is on record from any part of the Papuan Island. The few, known to me, are comprised in the following list:—*Mosses:* Rhizogonium spiniforme, Neckera phyllogoniacea, Leucophanes Reinwardtiana, Entodon Lawesii and seemingly a tall Dawsonia. *Lichens:* Leptogonium inflatum, L. tremelloides, Ocellaria Papuana, Chiodecton rubricinctum, Graphis venosa, Opegraphe melanohpthalma, Trypethelium grossum, Porina præstans, P. multiseptata; all these lichens from Dr. Naumann's gatherings. *Fungs:* Lentinus calvescens, Panus torulosus, Lenzites aspera, Polyporus xanthopus, P. sanguineus P. flabelliformis, P. longipes, P. Leprieurii, P. Australis, P. senex

P. Hasskarlii, Trametes occidentalis, Hexagonia polygramma, Stereum Bonjanum, S. lobatum; all obtained by Mr. Armit. *Algs:* Sargassum decurrens, Cystophyllum muricatum, Turbinaria vulgaris, Chneospora obtusangula, Hydroclathrus cancellatus, Vidalia pumila, Amansia glomerata, Acanthophora dendroides, Desmia ambigua, Gracilaria lichenoides, Sarcodia palmata, Hypnea hamulosa, H. seticulosa, Phycoseris reticulata, Chætomorpha valida. These cryptogamic plants were named by the following renowned specialists respectively: Dr. C. Mueller, Dr. J. Mueller, Dr. M. C. Cooke, Dr. W. Sonder. New Guinea ought to yield us thousands of evascular cryptograms from its lowlands jungles up to its alpine summits.

The following genera of plants are now known to be represented also in New Guinea, irrespective of those mentioned in the Malesia and in the present work; but the Papuan species so far have as yet not been defined from the mostly imperfect material available: Oxymitra, Chloranthus, Busbequea, Cratæva, Schuurmansia, Sterculia, Triumfetta, Hopea, Vateria, Antidesma, Omalanthus, Elatostemma, Cudrania, Celastrus, Samadera, Spondias, Mollugo, Salicornia, Alysicarpus, Cajanus, Uraria, Pueraria, Strongyloden, Lagerstrœmia, Nauclea, Lasianthus, Modecca, Hodgsonia, Cucumis, Agapetes, Labisia, Ardisia, Diospyros, Strychnos, Melodinus, Graptophyllum, Buechnera, Spatoglottis, Habenaria, Smilax, Monochoria, Scirpodendron, Hypelythrum, Sporobolus, Cyathea, Alsophila, Hypolepis, Spiridens. Several of these were first mentioned as Papuan by Dr. Beccari in D'Albertis's New Guinea ii. 396—400, where also additional notes on Palms are given. Of many of the genera, previously recorded, now additional species are known, often however only in a state insufficient for exact examination.

The six parts of Dr. Beccari's splendid "Malesia," issued between 1877 and 1884, contain accounts of plants belonging to the orders of Magnoliaceæ, Monimiaceæ, Myristicaceæ, Nepenthaceæ, Violaceæ, Chailletiaceæ, Euphorbiaceæ, Olacinæ, Araliaceæ, Rubiaceæ, Ericaceæ, Coniferæ, Cycadeæ, Burmanniaceæ, Aroidæ, and Palmæ—Papuan species being described along with others from the Sunda Islands, often extensively and connectedly.

On counting up what is known now of the Papuan vegetation with specific exactitude it will be found that about 1000 species stand as hitherto defined on literary record. Of these writings of Blume, Miquel and Scheffer gave about 380; Beccari's Malesia added to them about 140, largely new to science; the "Papuan Plants" up to date made additions to the extent of about 420, mostly known from India and Australia before (including 34 evasculares); De Candolle's monographiæ and some other recent works give about 60 more. Thus the species of plants, hitherto determined, are forming probably not more than one-third or even only one-fourth of those, constituting the flora of vasculares of the great Papuan Island.

From these and other data we are justified to conclude already, that the botanic (though far less the zoologic) features of the Papuan lowlands are mainly Malayan; but it remains yet to be ascertained, whether the high-land-flora of New Guinea is chiefly repeating Himalaian or perhaps Australian types or largely representing endemic forms. The known presence of Araucaria and Epacridæ in temperate altitudes vindicating already for the up-land flora of New Guinea to some extent an Australian character, while the vegetation of the north-east portion of the Australian continent is largely Malayan also.

These questions of the features of the Papuan flora—so important for phyto-geography—will with other scientific problems likely be solved this year to some degree through the two expeditions, which just set out on their glorious errands,—the one under the command of Capt. Everill, R.N., and provided for by the Governments of New South Wales and Victoria; the other under the leadership of Mr. H. O. Forbes; the former fitted out by the Geographic Society of Australia solely, the other by that society and several English scientific unions jointly.

Melbourne, June 1885.

NATURAL PROGRESSION.

BY

HEYKIM NABI COSMOS.

When we see the surprising changes in the way of emigration, or even commerce, of only, say, one century, which have altered the natural aspects, and influenced the aborigines of New Zealand, Australia, and North America, how shall we estimate the results of four hundred years, and a tenfold tide of trade and commerce? When the Caucasian race, with their augmented energies, and higher conceptions of functional relations, have taken possession of all the favourable regions of the habitable globe, the aborigines must amalgamate with the more civilized and enlightened race, or become extinct, being supplanted by the white offspring of a healthier, hardier, and superior development, and endowed with newer elasticity of mind and muscle. This sudden extinction of the weak, and the incessant advance of the strong, may appear to some a stern and harsh law, but such are the facts; it is only a question of time, and of mental and material appliances. The whole history of the Old World is but a record of decline and progress--the gradual extinction of the old and effete in our days—Turkey and Spain, for instance—and the gradual advancement of the young and vigorous. Nor does progress stop with the white race,—by virtue of the great law of Cosmical progress they will be superseded by higher varieties (which varieties probably exist elsewhere, or in coming ages will exist, as Locke and Bolingbroke express themselves) of created beings superior to man, and, as the poet writes—

> "What vast infinitude of worlds may grace—
> What beings people the stupendous place."

"Earths on Earths may go cycling on" in space, teeming with all kinds of animals and human beings, and we have no reason to deny that planets may be populated with a far superior class of beings than ourselves; and, although astronomers differ as to the constitution and atmosphere of many planets, yet there is no reason for disbelieving that beings may be constituted of etherea! matter, and fed with a similar food, so attenuated that we are unable to appreciate, much less to distinguish or discourse of them, by reason of our ignorance of scientific research.

We may feel the effect of a material force, as the wind or gravity, yet we cannot perceive the power or matter which originated force.

The tremendous astronomic force is neither seen nor heard, which every moment holds the compact of the physical universe together: the lightning is, in fact, but a mere fire-fly spark in comparison; but, because it glares on the clouds, and thunders so terribly in the ears, and rives the trees or the rock whence it falls, many will be ready to think it a vastly more important agent than gravity, which

> "Keeps this earth a sphere,
> And guides it onward in its course."

The fine particles of camphor which affect the nerves of smell, and steam in an active state, are invisible, the same as CHNO, yet we are as certain of their existence as of our own.

As animalculæ exist in water, which require a powerful microscope to distinguish them, so may matter be so attenuated or subtle (spiritual or ethereal) that with all the scientific appliances we now possess or may hereafter discover, we shall be unable for generations, perhaps, if ever, to see, much less examine, its peculiar properties; and yet that matter may have as fine, if not far nobler and transcendental a form, surpassing our limited knowledge, as our grade and rank in the animal kingdom excels the nearly invisible *monad atomus*, or minute mass of protoplasm, the amæba, or even the eozoon, which is one of the yet discovered lowest types of animal creation, to whom an atom is a thousand worlds. The Scripture says, "a spirit hath not flesh and bones as ye see me have," but it is nowhere said that a spirit hath no material parts, or only an attenuated etheric or gaseous form.

When matter becomes too attenuated to reveal itself, they (theologians) complacently call it spirit, and when this ethereal matter or electricity acts, they style it a miracle.

All things which exist are material; without matter nothing exists. Matter, however, may, in future ages, turn out to be only varied forms of one primitive element.

> "O, that this too solid flesh would melt,
> Thaw, and resolve itself into a dew."
>
> —*Shakspeare.*

> "I to the elements
> Resign the principles of life sent me."
>
> —*Sir W. Scott.*

Cyrus said to his sons "You will as speedily as possible give back my body to the dust; for what can be more desirable than to mingle with that which produces and fosters all that is beautiful, and all that is good? It will, methinks, give me pleasure to become identified with that which is the great benefactor of mankind."

HOLIDAY RAMBLES IN THE AUSTRALIAN ALPS.

BY

JAMES STIRLING, F.L.S., F.G.S., Etc.

PART III.

Having fairly entered the field of our discoveries, let us now rest for refreshments. While the water is boiling in the billy, and if you have still any of the sassafras bark we obtained in the gullies at the higher levels of the Dividing Range near Tongio, let us put some in the vessel along with the tea and test its flavouring properties. *Apropos* of this—while the tea is cooling—do you know that we are indebted to our energetic chemist and legislator, Mr. Bosisto, M.L.A., for our knowledge of the properties of this and other medicinal Australian plants. From Mr. Bosisto's chemical researches we learn that Atherosperma Moschata, the native sassafras, is one of the most valuable trees we possess in Victoria for medicinal purposes. A decoction from the inner rind of the bark—which is very sweet, with a smell like new ale—forms a good substitute for yeast! that it has been employed for bronchial affections with beneficial effect. It is also a diuretic, a diaphoretic, and a sedative; and Mr. Bosisto is of opinion that the alkaloid obtained from the bark, called Atherospermine, may prove serviceable in low fevers. The oil has been employed in diseases of the heart. Who knows but that in a very short time our native shrubs will not only supply all our medicinal wants, but furnish material for exportation, and that our sassafras will prove almost as valuable a curative agent in certain ailments as the far-famed chincona of the Peruvian Andes. This small tree near us, with its handsome white flowers and dark sap-green foliage, the leaves small, and the branchlets thorny; what is it? This, my friend, is the Kangaroo thorn, Bursana Spinisa, here attaining great luxuriance. From yon tree whose trunk is fully one foot in diameter, a large quantity of acetic acid could be obtained by distillation. The wood is close-grained, whitish, and takes a fine polish. This tree is found in many parts of Australia, but flourishes best on the limestone formations. Now that we have lunched and found that the sassafras imparts an agreeable flavour to the tea, let us proceed up this gully from Bindi Creek towards the Nunenyong range, noting as we travel along any alterations in the rocks. By-and-by we will examine the various species of plants that occur at different elevations on the limestones and adjoining rock masses.

We are now 2300 feet above sea level as determined by the aneroid; and what are these coarse reddish or purplish looking rock masses in the creek bed, and protruding on the hillsides underneath the limestone beds? Ah, you have made another discovery this time what geologists would call a stratigraphical and lithological one, *i.e.*, here are two sets of strata made up of different materials. Those purplish looking rocks are conglomerates and sandstones. See, they are composed of rounded fragments of other rocks rounded by the action of water and cemented together. And there are bands of coarse gritty sandstone. Measured with the clinometer the dip of these massive conglomerate beds is 46° to S.W., and are certainly stratigraphically inferior to the limestone beds. Let us follow the line of contact round the margin of these bluffy outcrops and see if there are no other kinds of rocks associated with the conglomerates and sandstones; and by an examination of the lowest beds of yellowish and earthy limestone ascertain, if possible, the presence of fossils, which would indicate the age of the lower bands. Ah! here is another fossil, a cystiphyllium, which Professor M'Coy will inform us is characteristic of Upper Silurian and Devonian formations, and of which we are the first discoverers in Victoria. And here is another kind of rock—a silk micaceous shale, which is seen to dip under the limestones, and overlie the conglomerates. Now these shales and conglomerates are identical in lithological character with the Mount Tambo beds, and we have here a geological problem to unravel. Other more able geologists have differed as to the age of these Mount Tambo beds, one asserting that they were older than the Bindi limestones,* the other that they were younger, and consequently Upper Devonian.† Now we may be able to throw some light on the question, and help to settle the dispute; but in order to do so we must carefully examine all the bounding rocks, and take correct observations and measurements, for in a district like this, which has been subject to such powerful plutonic forces and displacements of the crust, great care is needed to determine the sequence of the formations.

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* Selwyn, A. R. C.—Notes on the Physical Geography, Geology, and Mineralogy of Victoria. Intercolonial Exhibition, 1866, p. 16.

† Howitt, A. W., on the Devonian rocks of North Gippsland, vol. 1, p. 231.

(To be continued.)

BOTANY—THE OLD AND THE NEW.

BY

R. L.

A love for natural woodland scenery lies deep in the English heart. We may for certain purposes copy the terraced gardens of Italy, the trim neatness of French parks, or the quaint pattern-clipping of the Dutch; but the untended forest glade, with its wealth of varied foliage in tree and underwood, creeper and herb, gives a fuller pleasure. The most widely prized descriptive writing in English national literature is that which recalls the varied hues, the changing lights, and the movements of foliage swayed by the wind. Possibly our forefathers may have enjoyed the pleasures even more keenly than we do; they were more constantly among them, and by habit learned to notice more closely than we do. But, though in our towns and small gardens we now imitate geometrical carpet patterns in our flower beds because they bring the greatest variety of colouring into a small space, and relieve our main thoroughfares with lines of trees lopped to such uniformity as can be commanded, we still are glad when we can get out among woods with minds at leisure to enjoy them. It is the fashion nowaday to analyse our likes and dislikes, and we are not satisfied unless we can express the influences that affect us as do certain groups of sound waves, light waves, and so on, acting through certain nerves on particular parts of the brain. But who can analyse the complex pleasure of a day in the woods; and, when out, who cares to try? To stop to think how we are being influenced would draw away attention from beauties around us. It is sufficient that there is the feeling of enjoyment. Questions as to how and why we enjoy anything are intellectual occupations for the study, but when there is opportunity to "drink in" nature without any mental effort it is a delight not to be interfered with.

The enjoyment of nature as she appears and the pleasure of finding out how nature works are very different. It was only in the middle of the seventeenth century that people began to pull trees and plants to pieces to see how they were made. Nehemiah Grew's celebrated "Anatomy of "Vegetables" was about the first work on the subject published, and the first series of drawings of microscopic sections of wood and seeds appeared in the transactions of the Royal Society of Great Britain during the years which closed the century. In the second half of the next century there was great activity in examining and grouping plants according to the system laid down by Linnæus, and at the end of the century the chemistry of the food of plants began, through Ingenhousz and others, to engage attention. And now,

under the general designation "botany," we have a group of studies which can only be carried on indoors. Indeed, a man might win renown as a botanist in his own special department without ever having seen a living plant. The very first step is to begin to pull it to pieces. Its different parts have to be sliced up for longitudinal, transverse, and oblique sections for the microscope. Its petals and leaves have to be macerated in spirit to obtain the colouring matter for spectroscopic examination. Its wood and leaves and fruit have to be separately examined by a combustion process, to ascertain the amount of carbon, hydrogen, nitrogen, etc., they contain. If its seeds are put to grow, they will perhaps be on a rotating wheel to see if gravitation determines at which end they will sprout, or they may be put in some chemically-prepared mould, kept in a glass case with a ventilator self-regulating according to temperature, supplied with light of some one colour only, and be daily weighed and measured. It is only by patient laboratory work that we have gained the knowledge we have of plant life, and the solution of one problem opens up others which demand for their solution more work of a similar kind. These researches are not only of interest in themselves and their bearing on the great problem what life is; they not only have a fascination for the poet who—

> Sees alike in stars and flowers a part
> Of the self-same universal being
> Which is throbbing in his brain and heart;

but they attract the practical man whose business is to grow plants and crops. By knowing how plants live, he knows better how to cultivate them, and his interest in such studies is very definite.

But, besides the real scientific workers and the practical men who seek how far the knowledge gained can be made available for supplying the needs of life, there are a host of *dilletanti* followers in science always ready to take an interest in the latest novelties or the most recent way of studying some aspect of nature. There is as much following of fashion in this as there is in dress. The tulip mania and the collection of costly shells are matters of history only, but many will remember the aquarium rage. In a less prominent degree there are fashions in the way of what is called studying botany. These changing fashions do not affect the progress of the science, but they do indicate changes in popular taste led into different directions. The text-books of the present day are totally different from those of twenty years ago. Shapes and arrangements of leaves and flowers used to come first, and minute structure after. Now the cell, cell growth, and cell contents come first, and the forms of leaves and flowers, and their arrangement occupy a subordinate position. This, no doubt, is a properly philosophical procedure for those who do not merely fitfully take up the study. But the effect on those who do so take it up is to lead them away from such direct observations as they could make for themselves in the field to second-hand information derived from atlases of plates. Text-books and examination papers have more than a direct influence. Their indirect influence is wide. As physiological botany has come more and more into fashion, attention to form and arrangement has gone out of fashion. The young generation who give one hour three days a week to "grinding up" botany vote it "out of date." In the same way White of Selbourne, Kirby and Spence, and Sir William Jardine are "out of date." A botanist of the old type "out of date" was gradually coming to be looked upon as a feeble man content to take things as he saw them, and incapable of the effort of following the more abstruse problems modern science has

entered upon. But those who have not had their love of country stifled by the conventionalities and systematised teaching of modern life will rejoice that one holding such a recognised position in the scientific world as Sir John Lubbock thinks the study of the forms of leaves worthy of attention. It is an open-air study. In his discourse at the Royal Institution on "The Forms of Leaves," he pointed out how much there is to observe in the adaptation of their size and shape and relative position, and in the proportion of the size of the stem to the surface of the leaf. "The reign of law" is to be traced here, though so little attention has been paid to the subject. The distance leaves are apart, the shape that groups of them assume, their thickness and symmetry, or unsymmetry, all are interdependent. The details he brought forward he spoke of as only an outline sketch of observations to be made, and these were put forward in a way that demands neither the credence of the evolutionist nor of the believer in design. The facts are simple observations in themselves. The observations are on the lines of the old-fashioned field botanist, and lead men out to the meadow and the woodland.

ON PROBABILITIES.

BY

ROBERT THOMSON, F.I.A.

No. I.

The "doctrine of chances" has been a fascination to mankind in all ages. Mighty events have been ruled by the fatal hazard of a die.

The schoolboys play at "pitch and toss." Supposing each boy to be equally skilful, in the long run each would remain as he began, neither richer nor poorer. But if the game went on for only a few throws, there is a strong likelihood that one of the boys would be the possessor of the coppers of the other. Supposing one boy by study has arrived at a knowledge which the other does not possess, that he can regulate the momentum of the half-penny he "skies," so that he can judge with some degree of probability whether his throw will turn up *head* or *tail*, he has the advantage of his opponent. He calculates his probabilities, crudely enough no doubt; but to a certain extent he has the advantage of his competitor. Even with perfectly fair

dice and dice-box, one thrower may be much more successful than another. A skilful turn of the wrist, a slight change in the momentum of the dice leaving the box gives him an advantage over his rival. To some slight extent *he controls probabilities.* So the bookmaker, honest and fair in all his dealings as many no doubt are, has a great advantage over the outside neophyte who bets with him. He has knowledge, which the other does not possess. He has a coarse sort of knowledge of the "Doctrine of Probabilities," which the other is without. His skill controls, to some extent, what otherwise would be an absolutely even bet.

The probability that the sun will rise in the east to-morrow morning, or rather that the earth will continue its eastward revolutions on its own axis as heretofore during humanly endless ages, is so great that it may be regarded as certainty. This may be expressed as *unity.* The probability of an eclipse of the sun or moon, or of the recurrence of a transit of Venus at a certain time is so great that the astronomer versed in what has passed in former years is almost certain that his predictions will turn out right. This certainly again is almost equal to *unity.* Not so much so with our erratic visitors, the comets. The astronomer cannot, with any considerable accuracy, determine the probability of the recurrence of one of these visitants.

So with human life. There is a strong probability of any one of 100,000 individuals surviving twenty-four hours; yet there is pretty nearly a certainty of the total number being reduced during one revolution of the globe.

In probabilities we reason from *what has been* in the past to *what may be* in the future. Our learned friend at the Observatory forecasts the future climatic conditions of the next twenty-four hours from his experience of the past, and his knowledge of what has been going on among the elements all around. He states the probabilities; no more. He can do so with far greater chance of being right than can Hodge, the weatherwise ploughman, or Tom Bowline, the nautical meteorologist. His vast collection of experiences gives him a great advantage in the game of probabilities over the others, who have only their individual records of the past to guide them.

In the present paper I am largely indebted to a valuable "Treatise on Probability," by Sir William Lubbock and Mr. Drinkwater Bethune, published about 1840, under the auspices of the Society for the Diffusion of Useful Knowledge, established by the versatile the late Lord Brougham, and to "An Essay on Probabilities," published by the late Professor De Morgan in 1838, as well as to a work by John Francis, the Annalist of the Bank of England.

De Morgan says "When the speculators of a former day were busily employed in constructing celestial tables for the use of prophets, or investigating the qualities of bodies for the manufacture of gold, no one could guess that they were accelerating the formation of sciences which should themselves be among the most essential foundations of navigation and commerce, and through them of civilization and government, peace and security, arts and literature." He goes on to say that the warmth of mysticism and superstition are not always necessary to fostering the early growth of speculative science, as "there are cases in which cupidity and vacancy of mind will do as well. Cards and dice were the early aliment of the branch of knowledge before us. . . . Its utility is now generally recognised in all the more delicate branches of experimental science in which it is consulted as the guide of our erroneous senses and the corrector of our fallacious impressions. . . . It is the source whence we draw the means of equalising all the accidents to which humanity is heir, whether

of one's own individual life, or of commerce, or of war and peace." It "contains the principles on which it is found practicable to induce many to join together and consent that all shall bear the average lot in life of the whole."

Early in the seventeenth century the first step towards the development of the doctrine of chances into the regions of science seems to have been taken by Galileo in a letter to a now forgotten friend, in which he showed the probabilities of any particular numbers turning up in a sequence of throws of three dice. This paper, posthumously published, contained a table of the permutations of all numbers which can be thrown with three dice. The fragment in question is extremely rare and I doubt whether an English student will find it outside the great national library of the British Museum. Galileo being intent on other scientific researches appears not to have devoted further study to this particular one.

Soon after Galileo's demonstration, Pascal proved, much to the discomfiture of the Chevalier de Merve ("a man of talent but no mathematician"), that his preconceived ideas of the probabilities of gain or loss between two players were wholly wrong. The Chevalier was so chagrined that he declared that "the science of arithmetic is inconsistent with itself." Fermat and Pascal and others corresponded together on questions of dice and cards during the latter middle portion of the seventeenth century. These studies were the foundation of the structure on which is based the essence of life assurance; alone a great factor in the daily life of us of the present generation. What has been left unaccomplished during these two centuries, would take less time to enumerate, than to give even a brief catalogue of the labourers and their works whose researches and discoveries have placed even the unlearned of this generation on a pinnacle of knowledge far higher than the aspirations of Cagliostro himself. Suffice it to mention among the men of science who have followed Galileo and Pascal, some few of them who have devoted part of their attention to the fascinations of the Doctrine of Chances. John De Witt, the great Netherlands statesman, was the first to apply the revelations of the doctrine to the practical exigencies of human life. He was the first to prove that annuities and their congener life assurance were dependent on probabilities. Then we have Leibnitz, the Bernoullis, Laplace, Simson, Halley, Price, Morgan, Milne, De Moivre, Sir Isaac Newton, Euler, and many others. John Graunt, in the days of the great plague of London and its great fire, was engaged not so much in evolving questions in probabilities, as in collating statistics and exploding errors. The transactions of the Royal Societies of England and of Edinburgh teem with *brochures* by the most brilliant and recondite thinkers, as do also the records of the French Academy on questions of probability. Paley, the immortal theologian, was eminently a student of probabilities. In our own days I think De Morgan is the *facile princeps* of students of probabilities, and next to him I may name Mr. Thomas Bond Sprague, who has combined with what Carlisle might call the most thoroughest knowledge of the theory of chances, its practical development in the exigencies of our daily life. With signal success he has applied his abstruse speculations to the daily routine of the control of the finance of life assurance.

In my next paper I trust to be able to give somewhat of a more connected account of the progress of the science than I have been enabled to do in the present article, and with the kind permission of the editor, I propose subsequently to treat of some of the more interesting problems

which have vexed the minds of all sorts and conditions of men from the simple thimble-rigger or three-card man to the nearly infallible bookmaker to those of the actuary who discerns the probability of issue to a first, second, or third marriage, and the chance of any one of problematical children becoming heir to the peerage of the Duke of Southdown-Merino, and to his colossal estates in Australia, and who can tell the honourable Mr. Youngerson the exact value of his interest in the great duke's pile.

(To be continued).

THE LENGTH OF THE DAY,

BY

WILLIAM WHEWELL, M.A.

Let us consider the time of the revolution of the earth on its axis; and we will find here also that the structure of organised bodies is suited to this element; that the cosmical and physiological arrangements are adapted to each other.

We can very easily conceive the earth to revolve on her axis faster or slower than she does, and thus the days to be longer or shorter than they are, without supposing any other change to take place. There is no apparent reason why this globe should turn on its axis just 366 times while it describes its orbit round the sun.

The revolutions of the other planets, so far as we know them, do not appear to follow any rule by which they are connected with the distance from the sun. Mercury, Venus, and Mars have days nearly the length of ours. Jupiter and Saturn revolve in about ten hours each. For anything we can discover, the earth might have revolved in this or any other smaller period; or we might have had, without mechanical inconvenience, much longer days than we have.

But the terrestrial day, and consequently the length of the cycle of light and darkness, being what it is, we find various parts of the constitution both of animals and vegetables, which have a periodical character in their functions, corresponding to the diurnal succession of external conditions; and we find that the length of the period, as it exists in their constitution, coincides with the length of the natural day.

The alternation of processes which takes place in plants by day and by night is less obvious, and less obviously essential to their well-being, than

the annual series of changes. But there are abundance of facts which serve to show that such an alternation is part of the vegetable economy.

In the same manner in which Linnæus proposed a Calendar of Flora, he also proposed a *Dial of Flora*, or flower clock; and this was to consist, as will readily be supposed, of plants, which mark certain hours of the day by opening and shutting their flowers. Thus the day-lily (*Hemerocallis fulva*), opens at five in the morning; the *Leontodon taraxacum*, or common dandelion, at five or six; the *Hieracium latifolium* (hawkweed), at seven; the *Hieracium pilosella*, at eight; the *Calendula arvensis*, or marigold, at nine; the *Mesembryanthemun neapolitanum*, at ten or eleven; and the closing of these and other flowers in the latter part of the day offers a similar system of hour marks.

Some of these plants are thus expanded in consequence of the stimulating action of the light and heat of the day, as appears by their changing their time when the influences are changed; but others appear to be constant to the same hours, and independent of the impulse of such external circumstances. Other flowers by their opening and shutting, prognosticate the weather. Plants of the latter kind are called by Linnæus, *meteoric* flowers, as being regulated by atmospheric causes; those which change their hour of opening and shutting with the length of the day, he terms *tropical*; and the hours which they measure are, he observes, like Turkish hours, of varying length at different seasons. But there are other plants which he terms *equinoctial;* their vegetable days, like the days of the equator, being always of equal length: and these open, and generally close, at a fixed and positive hour of the day. Such plants clearly prove that the periodical character, and the period of the motions above described, do not depend altogether on external circumstances. Some curious experiments on this subject were made by Decandolle. He kept certain plants in two cellars, one warmed by a stove and dark, the other lighted by lamps. On some of the plants the artificial light appeared to have no influence (*Convolvulus arvensis*, *Convolvulus cneorum*, *Silene fruticosa*), and they still followed the clock hours in their opening and closing.

The night-blowing plants appeared somewhat disturbed, both by perpetual light and perpetual darkness. In either condition they accelerated their *going* so much that in three days they had gained half a day, and thus exchanged night for day as their time of opening. Other flowers *went slower* in the artificial light (*Convolvulus purpureus*). In like manner, those plants which fold and unfold their leaves were variously affected by this mode of treatment. The *Oxalis stricta* and *Oxalis incarnata* kept their habits without regarding either artificial light or heat. The *Mimosa leucocephala* folded and unfolded at the usual times, whether in light or in darkness, but the folding up was not so complete as in the open air. The *Mimosa pudica* (sensitive plant) kept in darkness during the day-time, and illuminated during the night, had in three days accommodated herself to the artificial state, opening in the evening and closing in the morning; restored to the open air she recovered her usual habits.

Tropical plants in general, as is remarked by our gardeners, suffer from the length of our summer daylight; and it has been found necessary to shade them during a certain part of the day.

It is clear from these facts that there is a diurnal period belonging to the constitution of vegetables; though the succession of functions depends in part on external stimulants, as light and heat, their periodical character is a result of the structure of the plant; and this structure is such, that the

length of the period, under the common influences to which plants are exposed, coincides with the astronomical day. The power of accommodation which vegetables possess in this respect is so far from being such as either to leave the existence of this periodical constitution doubtful, or to entitle us to suppose that the day might be considerably lengthened or shortened without injury to the vegetable kingdom.

Here, then, we have an adaptation between the structure of plants, and the periodical order of light and darkness, which arises from the earth's rotation; and we find, moreover, that the arbitrary quantity in the two laws, the length of the cycle of the physiological and of the astronomical fact, is the same. Can this have occurred any otherwise than by an intentional adjustment?

Any supposition that the astronomical cycle has occasioned the physiological one, that the structure of plants has been brought to be what it is by the action of external causes, or that such plants as could not accommodate themselves to the existing day, have perished, would be not only an arbitrary and baseless assumption, but, moreover, useless for the purposes of explanation which it professes, as we have noticed of a similar supposition with respect to the annual cycle.

How came plants to have periodicity at all in those functions which have a relation to light and darkness? This part of their constitution was suited to organized things, which were to flourish on the earth, and it is accordingly bestowed on them; it was necessary for this end that the period should be of a certain length; it is of that length and no other. Surely this looks like intentional provision.

Animals also have a period in their functions and habits; as in the habits of waking, sleeping, eating, etc., and their well-being appears to depend on the coincidence of this period with the length of the natural day. We see that in the day, as it now is, all animals find seasons for taking food and repose, which agree perfectly with their health and comfort. Some animals feed during the day, as nearly all the ruminating animals and land birds; others feed only in the twilight, as bats and owls, and are called *crepuscular;* while many beasts of prey, aquatic birds, and others, take their food during the night. Those animals which are nocturnal feeders are diurnal sleepers, while those which are *crepuscular* sleep partly in the night and partly in the day; but in all, the complete period of these functions is twenty-four hours. Man, in like manner, in all nations and ages, takes his principal rest once in twenty-four hours; and the regularity of this practice seems most suitable to his health, though the duration of the time allotted to repose is extremely different in different cases. So far as we can judge, this period is of a length beneficial to the human frame, independently of the effect of external agents. In the voyages recently made into high northern latitudes, where the sun did not rise for three months, the crews of the ships were made to adhere, with the utmost punctuality, to the habit of retiring to rest at nine, and rising a quarter before six; and they enjoyed, under circumstances apparently the most trying, a state of salubrity quite remarkable. This shows, that according to the common constitution of such men, the cycle of twenty-four hours is very commodious, though not imposed on them by external circumstances. The hours of food and repose are capable of such wide modifications in animals, and above all in man, by the influence of external stimulants and internal emotions, that it is not easy to distinguish what portion of the tendency to such alternations depends on original constitution.

Yet no one can doubt that the inclination to food and sleep is periodical, or can maintain, with any plausibility, that the period may be lengthened or shortened without limit. We may be tolerably certain that a constantly recurring period of forty-eight hours would be too long for one day of employment and one period of sleep, with our present faculties; and all whose bodies and minds are tolerably active, will probably agree that, independently of habit, a perpetual alternation of eight hours up and four in bed would employ the human powers less advantageously and agreeably than an alternation of sixteen and eight. A creature which could employ the full energies of his body and mind uninterruptedly for nine months, and then take a single sleep of three months, would not be a man.

When, therefore, we have subtracted from the daily cycle of the employments of men and animals, that which is to be set down to the account of habits acquired, and that which is occasioned by extraneous causes, there still remains a periodical character, and a period of a certain length, which coincides with, or at any rate easily accommodates itself to the duration of the earth's revolution. The physiological analysis of this part of our constitution is not necessary for our purpose. The succession of exertion and repose in the muscular system, of excited and dormant sensibility in the nervous, appear to be fundamentally connected with the muscular and nervous powers, whatever the nature of these may be. The necessity of these alternations is one of the measures of the intensity of those vital energies; and it would seem that we cannot, without assuming the human powers to be altered, suppose the intervals of tranquility which they require to be much changed. This view agrees with the opinion of some of the most eminent physiologists. Thus Cabanis notices the periodical and isochronous character of the desire of sleep, as well as of other appetites. He states also that sleep is more easy and more salutary, in proportion as we go to rest and rise every day at the same hours; and observes that this periodicity seems to have a reference to the motions of the solar system. Now, how should such a reference be at first established in the constitution of man, animals, and plants, and transmitted from one generation of them to another? If we suppose a wise and benevolent Creator, by whom all the parts of nature were fitted to their uses and to each other, this is what we might expect and can understand. On any other supposition such a fact appears altogether incredible and inconceivable

PROCEEDINGS OF SOCIETIES.

VICTORIA.

The Geological Society of Australasia.

The usual monthly meeting of the General Council of the Geological Society of Australasia was held on Wednesday, the 16th inst., at their office, Phœnix Chambers, Market Street, Melbourne. There was a large attendance of members present. Sir Arthur Nicolson, Bart., occupied the chair.

The following were elected honorary members of the Society:—The Right Hon. the Earl of Derby, K.P., K.T., etc., His Imperial Highness Sayyid Burghash bin Sa'ced, G.C.M.G., Sultan of Zanzibar; Sir Lyon Playfair, Bart., F.G.S., F.R.S.; and His Excellency H. R. W. Johnson, President of the Liberian Republic; on the proposition of Mr. R. Litton, seconded by Sir A. Nicolson, Bart.

Messrs. W. Nelson, W. Mason, M.D., and Gerard Wright, C.E., were elected members of the Society.

The Honorary Librarian acknowledged donations from Mr. R. T. Litton of "The Principles of Physiology" and the *Australasian Scientific Magazine*. After some discussion the meeting terminated.

The Royal Society of Victoria.

The ordinary meeting of the Royal Society of Victoria was held at the society's hall, Victoria Street, Thursday night, the 10th September. Sixteen members were present. Professor Kernot presided.

Mr. S. K. Vickery was unanimously elected a country member of the Society.

GLACIATION IN THE AUSTRALIAN ALPS.

The Chairman, in introducing discussion on Mr. Stirling's paper on "Evidences of Glaciation in the Australian Alps," read a telegram from Mr. Stirling expressing regret that he was unable to be present.

Some speeimens whieh that gentleman had forwarded were handed round for inspection.

Mr. G. S. Griffiths said that our knowledge of the climate of Australia in times geologically recent was increasing, and referred to four memoirs on the subject, published within the past few months. Dr. Von Liendenfeld had recently discovered unquestionable traces of glacial action extending from the top of Mount Townsend, 7256 ft., down 1400 ft. to the 5800 ft. level. It was significant that while the larger signs were in abundance there was an absolute absence of striæ, all of which had weathered away. Mr. Stirling had picked up the same traces at the head of the Victoria, 5000 ft. above sea level, and had followed them down to 1000 ft. He had found striæ in the hard dykes and on some pebbles, and also reported moodinie *debris*. But the most undoubted evidence was the rounding into dome-shaped, undulating forms of rock, which always weather into jagged contours. Mr. Wilkinson, Government geologist of New South Wales, had demonstrated in a recent paper a change of climate in that colony from a semi-tropical condition in the Pliocene to a cold, pluvial condition in the Pleistocene. This was what might have been expected if Victoria was suffering glaciation, for such a region always has a rainy zone on its equatorial margin. Professor Hutton, of New Zealand, had addressed the students of Christchurch on the origin of the fauna and flora of New Zealand. To account for the presence there of north temperate plants, he had recourse to the theory that they had wandered south along the back of the Cordilleras, and so had avoided the heat of the equator. But it could be proved that Panama did not exist as dry land at the time required by this hypothesis. A glacial epoch would have allowed them to pass through the tropics by lowering the climate. But Hutton objected to a glacial epoch, because there is not suffieient eircumpolar land to act as a refrigerator by accumulating snow. It could be proved, however, that the requisite area of circumpolar land did exist in the Pliocene. Again he objected, because glaciation would have exterminated the flora and fauna of the south temperate islands, and it could be proved that no extermination had occurred since the Miocene. Against this it could be shown that such extermination was averted by the formation of a continent which included these islands, and this allowed their inhabitants to retire before the cold, and to return again in more genial times.

PAPERS.

A paper by Mr. A. W. Howitt, on "Metamorphic Schists and Intrusive Rocks of Ensay," was postponed till the next meeting.

Mr. Stirling's paper on "The Cryptogamia of the Australian Alps," was taken as read.

Mr. Fenton exhibited "Fuller's Spiral Slide Rule," the object of which is to simplify the making of abstract calculations up to four figures.

Historical Society of Australasia.

The monthly meeting of the Historical Society of Australasia was held on Thursday, the 3rd of September. Professor Elkington occupied the chair. There were also present—Messrs. A. C. Macdonald, R. T. Litton, James Larnach, and J. Blackburn. Mr. Matthew Larkin, of South

Melbourne, was elected as a member of the Society. Donations to the library were received from Mr. Robert Thomson, Mr. J. B. Walker, of Hobart, the Secretary of the Geographical Society, and Mr. R. T. Litton, as well as two copies of the *Australasian Scientific Magazine.* For these votes of thanks were accorded to the donors. After some discussion relative to the Bibliographical Society of Australasia, Mr. Larnach moved —"That the members of the Bibliographical Society be invited to amalgamate with the Historical Society," and the motion was carried. It was also decided that the ordinary Quarterly Meeting of the Society be held early in November, when some interesting papers will be read.

The Horticultural Society of Victoria.

The Horticultural Society of Victoria held its monthly meeting in the Eastern Arcade, Bourke Street, on Wednesday, the 2nd of September. There were present—The Vice-President, Mr. Hutchinson, in the chair; and Messrs. Bell, Carson, Harbison, Milton, Stewart, Stoddart, Wilkinson, Ardagh, Bailey, Boyce, Cole, Coghlan, Murdoch, Roberts, Taylor, and Woodmason.

Among the correspondence was a letter from the Secretary for Lands, dated August 29th, and stating that the permanent reservation of 28 acres 3 roods 5 perches of land in the parish of Jika Jika, city of Richmond, as a site for gardens, is duly notified in the *Government Gazette* of August 21st.

Mr. F. G. Moule was elected to fill a vacancy in the committee; and Mr. G. Brunning having resigned the office of vice-president, through pressure of business, Mr. J. F. Roberts was elected in his stead.

Payments amounting to £50 15s. 11d. having been passed, the meeting closed.

At the evening meeting, at which Mr. Ardagh was in the chair, Mr. Neilson, curator of the Society's gardens, tabled thirty varieties of Apples, of which Winter Strawberry, Wagener, Brownlees' Russet, Ben Davis, Willowtwig, and Leaver were among the best; twelve kinds of Pears, including Doyenne d'Alençon, Bergamot, Hertrich, L'Inconnue; and also a nice collection of cut flowers, comprising forty-eight varieties, amongst which were sixteen varieties of Camellias.

The National Agricultural Society of Victoria.

The ordinary meeting of the council of the National Agricultural Society of Victoria was held on Tuesday, the 8th of September, at the office, Kirk's Bazaar. There were present:—Dr. Plummer (in the chair), Mr. Buchanan, M.L.C., Mr. Gibb, M.L.A., and Mr. C. Young, M.L.A., and Messrs. J. Finlay, D. R. M'Gregor, F. Henty, J. Hearne, W. Thomson, J. M. Peck, J. Garton, F. S. Roberts, S. Gardiner, D. Munro, D. Mitchell, J. Currie, J. G. Brisbane, J. Smith, T. Learmonth, T. Brunton, C. Synott, W. J. Lobb, and H. Lennon.

THE SPRING SHOW.

The balance-sheet for the spring show, which was read, showed a profit of £1,974 9s. 8d. The chief items in the receipts were as follows:—Premiums on refreshments, £333 3s. 3d.; sale of catalogues, £110; gate receipts, £798 13s. 9d.; railway receipts, £758 17s. 6d.; entry fees and ground rates for stands, £263 10s.; refund from the Government for the champion prizes, £475; Government subsidy on prizes, £872 14s.; donations as prizes, £812 14s. 6d.; Grand Draught Sires' Produce Stakes, £120. The prizes awarded in cash and plate amounted to £1,982 18s. 6d.

Medical Society of Victoria.

The monthly meeting of the Medical Society of Victoria was held in the hall, Albert Street, on Wednesday evening, the 2nd ultimo. The President, Dr. Moloney, occupied the chair. The following new members were elected:—Drs. Mollison, Lempriere, jun., Porter, Colin M'Farlane, Sutherland, Hooper, and J. F. Malcolmson. One gentleman was nominated for election at the next monthly meeting. On the motion of the President it was resolved "that the Medical Society of Victoria do place on record its sorrow at the decease of Dr. Richard Malcolmson, an old and highly respected member, and do offer its deepest sympathy to his family." Dr. F. J. Owen read a paper on a case of poisoning by "extract of eucalyptus," the so-called extract being apparently the volatile oil of the eucalyptus globules. A letter from Baron von Mueller in reference to this paper was read by the Secretary, and several members spoke concerning the uses of preparations of eucalyptus, and the poisonous effects produced by large doses of the oil. Numerous pathological specimens were exhibited by Dr. Williams, Mr. Webb, and Professor Allen.

The Pharmacy Board.

The following are the candidates who passed at the quarterly examination of the Pharmacy Board of Victoria:—

Preliminary Examination, 1st September.—Richard Southby, Sandhurst George Joseph Wells, Kyneton; Frank Elms, Melbourne; Henry Holmes, Sandhurst; G. N. Miller, Sandhurst; Norman M'Leod, Melbourne; S. J. Wilkinson, Stawell; F. Harsant, St. Arnaud; J. H. Tanner, Nathalia. Sixteen candidates presented themselves for this examination.

Materia Medica and Botany, 2nd September.—J. A. Anderson, H. M. Martell, and Joseph F. Usher, all of Ballarat.

Modified Examination, 2nd September.—Charles E. Brown, Warragul; Edwin Plummer, Kilmore.

Practical Pharmacy, major examination (before the whole board), 3rd September.—Frederick F. Shelley, Sale; Thomas George Barnes, Hotham. Three candidates presented themselves for this examination.

Pharmaceutical Society of Australasia.

The monthly meeting of the council of the Parmaceutical Society of Australasia was held at the College of Pharmacy, Swanston Street, on Friday evening, the 4th of September. The president, Mr. William Bowen, was in the chair. Messrs. Frederick I. Eyre and John H. Dixon, South Australia; Angus McLeod and B. J. G. Weaver, New South Wales; Edward G. Owen and W. Y. Nelson, Melbourne—were elected as members. A communication from the Pharmaceutical Society of New South Wales was read, intimating that the proposal to hold an Intercolonial Pharmaceutical Conference had lapsed in consequence of South Australia, New Zealand, and Tasmania declining to take part in it. Some months ago the names of the delegates who would attend as representatives of Victoria were sent to Sydney, and also the suggestions as to the federation of the education and laws relating to pharmacy, which it was proposed to discuss. These, however, did not appear to be favourably received by the New South Wales society, and that body showed little interest in the project. The advisability of holding a conference in Melbourne next year was spoken of, and there is a prospect of it taking place. The committee who, in conjunction with Mr. J. Bosisto, M.L.A., undertook the framing of desired amendments in the Pharmacy Act, submitted a report, which was adopted, and the amendments to the proposed Dental Act, now before Parliament, protecting certain interests of pharmaceutical chemists, were considered and agreed to. The provisions for the teaching staff at the College of Pharmacy for the year 1886 were discussed at some length, and it is proposed to secure lecturers in chemistry, botany, and materia medica from England for the next session. It was resolved to forward to the Colonial and Indian Exhibition photographic views of the interior and exterior of the College of Pharmacy, and copies of the Society's journal of transactions.

Amateur Photographic Association of Victoria.

The general monthly meeting of the Amateur Photographic Association of Victoria was held on Tuesday evening, the 8th of September, at the Royal Society's Hall. Mr. E. C. Bell, vice-president, was in the chair. Messrs. Norris, Madden, Lang, and Mallet were elected members. Several photographs, forming the balance of a number received from the Amateur Photographic Association of Wellington, New Zealand, were placed on the table, some of them being of a high degree of merit, both in a technical and artistic sense. Mr. Lang showed a few portraits and views printed in Platinum. Subsequently, the Secretary demonstrated a method of preparing lantern transparencies on dry collodion plates. A plate was coated, sensitised in the silver bath, washed, coated with the preservative, and exposed under a negative to the light of the sciopticon; the picture was then developed, and the resulting transparency was exceedingly clear, and of a rich, warm tone. Several other slides, produced in the same manner, were passed through the lantern, in order to show the range of tones obtainable by this method. A slide printed in carbon was shown by Mr. Musgrove.

Field Naturalists' Club of Victoria.

The monthly meeting of the Field Naturalists' Club of Victoria was held at the Royal Society's Hall, on Monday evening, 14th of September. The President, the Rev. J. J. Halley, occupied the chair, and about seventy-five members and visitors were present.

A letter was read from Dr. J. E. Taylor, F.G.S., thanking the club for his election as an honorary member.

The Honorary Librarian acknowledged donations to the library of "Proceedings of the Royal Society of New South Wales for 1884," and "Proceedings of Smithsonian Institution, United States of America, for 1882."

The Honorary Secretary read an account by Mr. C. French, F.L.S., of the excursion to Cheltenham on the previous Saturday. The botanists of the party were well occupied on the trip, as about seventy-five species of plants were noted in bloom.

The following ladies and gentlemen were elected members of the Club:—Miss Milne, Mrs. Parker, Mrs. William Bage, Messrs. W. Bage, Joseph Bryant, and E. H. Hennell; whilst several were nominated for membership.

Papers for future meetings were promised by Dr. Dobson, Messrs. O. A. Sayce, A. W. Coles, H. T. Tisdall, F.L.S., and H. Watts.

The papers read comprised the following:—1. By Mr. H. Watts, on "Staining Vegetable Tissues for the Microscope." 2. By the Rev. Dr. Wools, F.L.S. (honorary member), entitled "Sanitary Properties of Eucalyptus." The writer recommended eight species of eucalyptus which were likely to prove useful where, on account of climate or geologic circumstances, *E. globulus* could not be grown. 3. By Mr. A. W. Howitt, F.G.S. (honorary member), on "Notes on a Basalt Vitrophyr from River Tangil Valley, Gippsland." This was on a basalt vitrophyr, or glassy basalt, from a volcanic formation, which had flowed over the bed of an ancient river, fusing the gravel comprising the bed into a solid quartzoze rock, locally termed cement. Specimens of the rocks were exhibited, and also sections under the misroscope. 4. By Mr. F. Reader, "Notes on some Hitherto Unrecorded Victorian Fungi," being a record of the species collected by the writer in Studley Park, and elsewhere near Melbourne.

Baron F. von Mueller forwarded, as also applying to this colony, an extract from the *Gardener's Chronicle* in which attention was called to the wholesale destruction of native plants in England, and recommending botanists and members of field clubs to discountenance wholesale sales of native plants, and the removal of plants for cultivation without special objects.

Mr. C. A Topp, M.A., read a note of a curious growth of fungi found by Mr. Tisdall in the Long Tunnel mine, Walhalla, 800 feet below the surface.

The principal exhibits of the evening were by the Rev. W. Alexander, 122 specimens of woods; by Mr. F. G. A. Barnard, four species of native orchids in bloom, grown by exhibitor; by Mr. A. Coles, pheasants from Samoa, woodcock, and Canadian quail; by Mr. J. E. Dixon, rare Victorian beetle *(Natalis titana)*; by Miss F. M. Campbell, 100 species of Australian lichens; by Mr. T. A. Forbes-Leith, a rare parrakeet from New Guinea, smallest species but one known; by Mr. C. French, F.L.S.,

Sumatran lepinoptera, and the rare beetle *(Neolamprima Muelleri)* from North Australia, just described in proceedings of Linnean Society of New South Wales; by Mr. J. T. Gillespie, Victorian birds' eggs; by Mr. H. W. Hunt, fan-tailed cuckoo (alive); by Mr. Hugh Kennon, fossils and geologieal specimens from Mount Noorat, etc.; by Master J. Lawrence, minerals; by Mr. D. Le Souef, head of Egyptian mummy about 4000 years old; by Mr. J. M'Kibbon, Victorian orchids in bloom; by Mr. A. H. S. Lucas, large lizard, from near Saltwater River; by Mr. F. Reader, fungi, in illustration of his paper; by Mrs. J. Simson, curious insect nests from Deniliquin, New South Wales, also native cucumbers.

The Zoological and Acclimatisation Society.

A meeting of the Council of the Zoological and Acclimatisation Society was held on Monday afternoon, the 7th of September, at the Society's office, 69 Temple Court. There were present—Mr. R. Simson (president), Mr. C. J. Jenner, M.L.C., Mr. C. M. Officer, M.L.A., and Messrs. Halfey, C. Purchas, A. Moule, C. Ryan, and F. R. Godfrey. The Director brought up a report and suggestions as to the best means of adding to the attractions of the Zoological Gardens, and augmenting the present insufficient income of the Society. A sub-committee of four members was appointed to confer with the Director on the subject, and draw up a report to be laid before the Council. It was reported that several improvements were now in progress at the gardens for the purpose of properly exhibiting some of the animals recently received from England. Amongst the stock which were acknowledged, with thanks, as having been received since the last meeting, were a tiger snake from Mr. T. F. Wilson, of Wallan Wallan; two striped Indian squirrels, from the Rev. Alex. C. Maitland; and two lyre birds (male and female), from Mr. Thomas Watton, jun., of Drouin.

Victorian Engineers' Association.

A meeting of the Victorian Engineers' Association was held at the Melbourne Exchange on Wednesday, the 26th of August. Mr. R. H. Shakespear was in the chair; and Messrs. D. Munro, R. Warnoch, G. James, K. L. Murray, G. Gordon, J. Keily, and A. C. Wannan were also present. Mr. Deakin, M.L.A., Mr. Derry, and Mr. S. Murray were present by invitation. Mr. G. Gordon, C.E. read a paper on "American and Australian Irrigation," reviewing at considerable length the reports of Mr. Deakin and Mr. Derry on the irrigation works of America. He concluded his paper with a summary of his views, in which he pointed out that the irrigation works of one country cannot be taken as models to be copied or reproduced in another; that the introduction of irrigation in a new country should, if possible, be made after proper investigation of the physical conditions; and that the study of the irrigation systems of old countries is at least as useful as, and probably more so, than that of tentative and hurriedly initiated works such as those of Western America.

He also urged with regard to the questions of expense that it is impolitic to persistently under-estimate the cost of irrigation works; that it is probable that works costing from £5 to £7 10s. per acre, first cost, are likely to be remunerative if undertaken by the persons who are to benefit by them; that irrigation and drainage must go hand in hand on economical as well as sanitary grounds; and that very large schemes, instead of being more economical, are likely to be less so than smaller ones. Mr. D. Munro moved, and Mr. K. L. Murray seconded, a vote of thanks to Mr. Gordon for the manner in which he had dealt with the subject, which was carried. Mr. Deakin stated that he would have much pleasure in furnishing the members of the Association with copies of the report of his visit to America, and a vote of thanks was passed to him for his kindness in the matter. A paper by Mr. J. Tipping on "A New System of Street Metalling" was finally discussed. Messrs. E. Seitz and J. Styles were unanimously elected members of the Association. It was decided that a deputation should wait on the Public Service Board, relative to the classification of the professional officers of the Government service, also that the Secretary of the Victorian Commission for the Indian and Colonial Exhibition should be elected an honorary member of the Association, and that the proceedings of the Society and the papers read by members should be printed and forwarded for distribution in the Victorian court at that exhibition.

Institute of Surveyors and Engineers.

The half-yearly meeting of the Institute of Surveyors and Engineers was held on Saturday, the 5th of September, at the Melbourne Exchange. Mr. Wm. Davidson, the president, occupied the chair. Mr. G. R. Steane and Mr. J. M. Reed were elected as members, and Mr. E. J. Brown as an associate. With regard to the question of the classification of professional members of the civil service, the committee presented a progress report, submitting their reply to the last letter of the Public Service Board, in which the latter asked for information as to the rates of remuneration paid to professional men outside the public service. The committee referred to the cases of gentlemen connected with the Melbourne Harbour Trust, the Tramway Trust, and the City Council, to show that much lower rates were paid by the Government than by these bodies for professional services, and that the best men were thus driven out of the Government employ into that of either those or similar bodies, or into the service of adjoining colonies where the remuneration is higher. Mr. A. Vickery read a paper on "The Application of Surveying to Geology in Victoria," which it was resolved to have printed. It was announced that the prize for the best paper submitted for the examination held at the University for the Institute's annual prize had been awarded to Mr. M. W. S. Magee.

Bibliographical Society of Australasia.

The second meeting of the Bibliographical Society was held on Wednesday, the 16th of September, at 3 p.m., at the offices of the Society,

Phœnix Chambers, Market Street. Mr. R. T. Litton, F.N.S., occupied the chair. There was a good attendance of members present. A letter from the Honorary Secretary of the Historical Society of Australasia was read, in which they invited the members of the Bibliographical Society of Australasia to amalgamate with them as their objects were almost identical. After a prolonged discussion, it was decided that the Honorary Secretary be requested to write to the Historical Society to ask for more definite terms, and would it be possible for the Councils to amalgamate with each other. The following gentlemen were elected provisionally as members of the Society:—Messrs. T. F. Phillips,, T. S. Bulmer, M.D., Robert Thomson, F.I.A., Richard Raw, James Stirling, F.L.S., F.G.S., etc., H. M'Kenzie, and James M'D. Larnach. The Hon. E. J. Barclay, Secretary of State of the Liberian Republic, was elected an honorary member. Messrs. Stirling, Bulmer, Larnach, and Thomson as members of the Council provisionally. The proceedings then terminated.

The Geographical Society of Australasia.

The fourth ordinary meeting of the Victorian branch of the Geographical Society of Australasia was held on Friday night, the 4th of September, at Gunsler's Café, Baron von Mueller, the president of the society, occupying the chair. A considerable number of ladies and gentlemen were present.

WESTERN TASMANIA.

Mr. G. S. Griffith (for Mr. C. P. Sprent, deputy surveyor-general of Tasmania), read a paper entitled "Explorations in Western Tasmania." The writer described the many difficulties encountered in exploring in Western Tasmania, through the mountainous and scrubby nature of the country, and then gave short accounts of various explorations he had made through different parts of that side of the island. The highest mountains in it were about 5000 ft. high, and the rivers were numerous. The flora was interesting and varied, including some very valuable timber trees. The animal kingdom was badly represented so far as numbers went, but there was plenty of variety. The only eatable animals were the wombat and the badger, but although there was little game, there was plenty of vermin—particularly tiger-cats—the most destructive beasts imaginable. During the summer months a few fish could be obtained in the rivers, and crayfish could be caught on the coasts, but the sea was generally too rough to allow the pastime or occupation of fishing to be followed. The results of mining and prospecting in Mount Bischoff and Mount Heemskirk were referred to, and it was stated that gold was found in almost all localities on the western coast—in some parts in payable quantities. The other mineral resources of the country were mentioned, and the writer concluded his paper by stating that the future prosperity of the west coast of Tasmania depended upon the value of its mineral resources; and although present prospects were not so bright as they were a few years ago, he considered that its resources were destined to convert its wild and desolate regions into scenes of busy industry and the dwelling-places of a prosperous community of miners.

A FEW DAYS IN WEST KIMBERLEY.

Mr. J. A. Panton, P.M., read a paper entitled "A Few Days Ashore in West Kimberley."

EXPLORATION IN NEW GUINEA.

Mr. A. C. Macdonald, F.R.G.S., the Honorary Secretary of the society, read a paper entitled "Some Account of the Society's Explorations in New Guinea." It contained a *résumé* of the explorations made in recent years in New Guinea, an account of what the society was now doing in regard to exploring the island, and a short report of the steps that were being taken to establish branches of the society in some of the other colonies.

The meeting then adjourned.

NEW SOUTH WALES.

No reports to hand.

QUEENSLAND.

No reports to hand.

WESTERN AUSTRALIA.

No reports to hand.

SOUTH AUSTRALIA.

No reports to hand.

TASMANIA.

Royal Society.

The monthly meeting of the Fellows of the Royal Society of Tasmania was held at the Museum building on Tuesday, August 11th. Mr. James Banard, Vice-President, occupied the chair, and there were also present the Bishop of Tasmania (Dr. Sandford), the President of the Legislative Council (Hon. W. A. B. Gellibrand), and about forty other gentlemen.

NEW MEMBER.

Mr. Turnbull was re-elected a Fellow of the Society.

PAPERS.

The following papers were read :—

1. Iceland and the Icelanders, by T. B. Woollnough. The paper gave an interesting description of the country and the inhabitants.

2. The Split Mosses, Bog Mosses, and Earth Mosses of Tasmania, by Mr. R. A. Bastow. The paper was a continuation of a series of Papers on Tasmanian Mosses that Mr. Bastow is engaged on.

3. Descriptions of some Fossil Leaves from Mount Bischoff, by Mr. R. M. Johnston, F.L.S. The two new fossil leaf impressions described by Mr. Johnston belong to the genera *Taxites* and *Eucalyptus*. The former was discovered by Mr. Thureau at Mount Bischoff, associated with clays, and in drift deposits underlying the basalt sheet formerly referred to in connection with the Tertiary Leaf Beds at this place. The species has been named *Taxites Thureaui*, in honour of its discoverer. The locality from whence the splendid new specimen of Eucalyptus (*E. Milligani*, Johnston) was obtained is not known, although supposed to be from Tertiary Leaf Beds at Macquarie Harbour, where probably it was discovered by the late Dr. Milligan. It is associated with well-known forms in Tasmanian Tertiaries belonging to the genera Fagus, Laurus, Cinnamomum, Magnolia, etc.

EXHIBITS.

Mr. T. Stephens exhibited a specimen of the Coal which had been found at some distance from Longford, on the road leading from that township to Launceston, and near Jordan's Bridge. The existence of coal had been suspected in the neighbourhood for the last forty years, but it had been left to Mr. Mason, a landed proprietor in the district, to prosecute a search, and he was rewarded by finding a seam which was stated to be four feet in thickness. He (Mr. Stephens) thought that these coal measures might be traced from near Hadspen to a place where he had reported favourable indications many years ago on the North Esk, and eventually to the Fingal Valley. The infiltration of water had loosened its texture, and had given it a flaky character, and it was that appearance, together with some of the surface indications, which led some persons to suppose that it was a lignite and not a true coal. It was, however, a true coal, and belonged to the same system as all the Southern and Eastern coal measures. There was an admixture of sulphide of iron, but not, apparently, in any objectionable quantity. The calcite present in the specimen was a point of resemblance between this and some of the Jerusalem and Fingal coal. It was not likely to prove prejudicial to the use of the coal for ordinary purposes. It seemed highly probable that the discovery would be a valuable and important one to those persons on whose property it was found. From some preliminary investigations, the proprietor had come to the conclusion that it rose in an easterly direction, and he was now driving from the lowest level that he could find in that direction, so as to strike it on a rise, and eventually drain the mine by gravitation.

Mr. R. M. Johnston remarked that the specimen which had been sent to him had rather a ligneous appearance. He had no hesitation, however, in saying that he believed it to be good coal, and from the presence of *Zeugophyllites elongatus*, *Phyllotheca*, *Taeniopteris*, and *Sphenopteris*, identical with species in the coal measures at New Town and York Plains. There was no doubt in his mind that it belonged to the mesozoic coal measures.

The Curator drew attention to two fine specimens of fish that had been secured, both new to the Museum, during the month. One of these, the

"Hapuku" *(Oligorus gigas)*, a fish that attains to a large size, in New Zealand many of them reaching to 150 lbs. in weight, is a deep sea fish, the present one being caught off the Hippolyte Rocks. The "Hapuku" has a peculiar interest from its close relationship to the well-known Murray Cod *(Oligorus Macquariensis)*. Dr. James Hector, M.D., F.R.S., in his "Notes on the Edible Fishes, New Zealand," says in regard to the flavour of this fish: "The head and shoulders cut off this fish is most dainty food, but the flesh of the remainder is rather coarse and stringy; it is, however, well adapted for pickling, and may yet become an article of commerce." The specimen now on view to the Fellows weighed 53 lbs., and had a roe weighing about 5 lbs. The other fish was one that Mr. Morton stated he had been unable to identify with any species of Australian, Tasmanian, or New Zealand fish, in fact, he was in hopes at the next meeting he would not only be able to describe it as a new species, but to make a new genus. This specimen had during the month been washed on the bank at Bridgewater, and had been forwarded to him by Mr. T. Stanfield.

Mr. R. M. Johnston said, in regard to the latter fish, he felt confident Mr. Morton would be perfectly safe in making a new genus, as it was altogether unlike any genus he had observed in Gunther's valuable work on Fishes.

The Curator also drew attention to two skulls of Tasmanian Tigers *(Thylacinus cynocephalus)* which had been presented by the Hon. W. Gellibrand, M.L.C., one being very large, the teeth in capital condition.

MICROSCOPE.

Mr. R. A. Bastow showed some beautiful mounted specimens of Tasmanian Mosses.

VOTE OF THANKS.

Bishop Sandford proposed a vote of thanks to the authors of papers read at the meeting, as also to the donors to the Museum and Library.

Mr. C. T. Belstead seconded the motion, which was carried unanimously.

NEW ZEALAND.

No reports to hand.

NOUMEA.

No reports to hand.

THE EDITOR'S CHAIR.

We have just received a copy of "The Science of Agriculture, by Frederick James Lloyd, F.C.S.; London: Longmans, Green and Co. This important work, as the preface informs us, consists mainly of a reproduction of lectures delivered at King's College, London. The object of the author, as stated by himself, is the very laudable one at the present agricultural crisis of elucidating "the only true means by which farmers may contend against adverse circumstances and increasing foreign competition." Mr. Lloyd has supplemented his study of agricultural literature by careful personal inquiry, and puts before his readers, in language as little technical as possible, not only the results of the latest scientific investigations, but the outcome of his own conversations with leading agriculturists. The carefully-tabulated analyses were for the most part made by himself, and evince a large amount of laborious and accurate research. The chapters on the chemistry and physiology of plant and animal life are treated at once with learning and simplicity, and the value of the facts recorded and the principles enunciated cannot be over-estimated from the agricultural standpoint. It is manifest that the chemical composition of the substances constituting the organisms of plants and animals is of the highest practical importance to the farmer, since the laws regulating the formation of those substances must be influenced or utilized by him in the cultivation of his crops and the raising of his stock. The intelligent selection of manures and diets is, in fact, dependent on his knowledge of chemical and physiological structure and the internal processes of plant and animal life, combined with a knowledge of the composition of foods. The sections dealing with the classification and the improvement of soils, natural and artificial manures, and the rotation of crops, contain the latest results of scientific inquiry and experiment on these important subjects. The chapter on permanent pasture will command a large amount of attention at the present time, when the stress of foreign competition and the consequent unremunerative character of arable land is leading so many to turn their attention to the laying down of land to grass. "Dairy management and produce" touches a question scarcely less interesting to the agricultural public nowadays, and the author has discussed it with the care and completeness it deserves. He is hardly so enthusiastic on the subject of ensilage as the warmest advocates of that substitutionary diet would desire, but thinks that the practice will be largely carried out in the future, "if silage can be shown not to influence the keeping property of the milk, nor yet the taste of the butter." All agriculturists who wish to add to the practical knowledge of their craft, a valuable acquaintance with its scientific principles, and to be put abreast of the latest methods and appliances, may be strongly recommended to procure this interesting and useful work.

At a recent meeting of the Linnæan Society a paper by Mr. Alfred Tyler was read in part. The whole was entitled "On the Growth of Trees and Protoplasmic Continuity." The portion of the paper which dealt with the growth of trees was that read before the Society. Mr. Tyler's chief object was to show the principles that underlie the individuality of plants, and to prove that plants have a dim sort of intelligence, and are not merely an aggregation of tissues responsive to the direct influence of light. Not only this, but that the tree as a whole knows more than its branches, just as the species know more than the individual, and the community than the unit. The result of Mr. Tyler's experiments, which have extended over many years, has been to show that many plants and trees can adapt themselves to unfamiliar circumstances, such as avoiding obstacles artificially placed in their way, by bending aside before touching, or by altering the leaf arrangement, so that at least as much voluntary power must be accorded to such plants as to certain lowly organised animals. Finally, Mr. Tyler contends that a connecting system, by means of which combined movement takes place, is to be found in the threads of protoplasm which unite the various cells, and that this connecting system is found even in the new wood of trees. He has also observed that the new wood of nearly all trees points upwards, but that year after year it changes its direction, showing much mobility.

With regard to the intelligence and observation of the aborigines of Australia in respect of flowers, the Australian blacks on the coast are expert fishermen, and are aware of the season of particular kinds of fish by the blowing of certain flowers; for instance, when the brilliant flowers of the waratch, or native tulip, appear, it is an indication that the sole is to be found on the sandbanks about Botany Bay and Cook's River. According also to the flowering of other trees and shrubs the time is known to them for the advent of mullet, of kingfish, schnapper, gurnet, etc., and that these will be found in the bays and rivers of the coast. In civilized England they also consider certain periodical occurrences of nature in flowers as guides in angling and other rural occupations. When the elder buds are developed fishermen consider that the eels leave their haunts; when the wheat blossoms anglers believe perch will bite readily. The flowering of certain plants in England is also associated with certain days. Thus with St. George's Day is associated the blue-bell; the Guelder rose, or snowball tree (*viburnum*) with Whitsuntide; the flowering of the elder with sheep-shearing. The mulberry, both in England and New South Wales, is a shy tree, and when its foliage is fully developed we may consider the summer established.

The Bill which has just been read a third time, and passed by the Ontario (Canada) Legislature, for the preservation of the natural scenery about Niagara Falls, provides for the appointment of a Board of Commissioners, who are empowered to select land for park purposes and recommend to the Legislature a plan for adoption. If the Commissioners fail to agree with property-owners as to the prices and terms of payment, the prices to be paid shall be determined by the provincial arbitrators. Should the park project be entrusted to a company, the company's grounds shall be open to the public free of charge, and all plans of proposed works shall be submitted to the Lieutenant-Governor in Council. The company may make agreements with other companies, may make rules and regulations to preserve order, and may acquire, under carefully stated conditions, lands and works necessary to the prosecution of their project.

The Blue Mountain Range, in New South Wales, is much frequented by fern-hunters, especially in the vicinity of Mount Wilson, where the summit of the ridge is largely covered with a dense growth of eucalypti, the mere trunks of which almost obscure the horizon, and in the undergrowth it is no exaggeration to say that thousands of tree ferns, ranging up to thirty feet in height, are visible in every direction. It is on the southern slopes that the sassafras jungle is found, in which mosses and orchids luxuriate, and festoons of lianes hang from the topmost branches. There are two peculiarities in this vegetation which are worthy of notice; first, that the tree ferns *(Alsophila australis)* frequently bifurcate at a short distance from the ground, and in many cases divide into three or four, and sometimes into five and six stems, from one root; second, that tree ferns (which must be of very ancient date) are frequently almost entirely absorbed by the growth of forest trees *(Quintinia sieberii)* which, germinating in the axels of their fronds, send down suckers to the ground, and enclose within their solid timber the fern-stems from which they derived their first support. In some cases are seen ferns which, having attained a growth of twenty feet in height, have been laid low by the wind, and where some portions of their heads have touched the ground a second growth of equal altitude has succeeded, which, in its turn, has been subsequently enclosed by a quintinia of large diameter, while the roots of the original tree fern still retain their vitality.

Natural History Sketches among the Carnivora.—By Arthur Nicols, F.G.S., F.R.G.S. (L. Upcott Gill, 170 Strand, London).—The publication of this little book, by the author of "Zoological Notes," at the present time is very opportune, as the public mind has of late been so much exercised by the wonderful instinct of our friend the dog. It is a very clever and interesting book, and it is difficult to believe that its author was at one time a shepherd "passing rich on earning £40 a year" in the Australian bush. The first chapter treats of wild animals, lions, tigers, leopards, and jaguars, the latter the most ferocious of the great cat tribe. The next chapter treats of the domestic cat, and a well-deserved charge is made of specific cruelty inflicted by so many thoughtless people on poor puss by those who, on leaving home, so often leave her to take care of herself. The anecdotes of cats are very interesting, and go far to prove that with all its domestication and all its advantages it still remains, in most of its characteristics, an unreclaimed savage. Although we cannot endorse all that is said about the homing instincts of our domestic animals, some inferences are drawn which are worthy of attentive consideration. The author seems to have possessed an excellent breed of retrievers, and tells stories of dogs enough to prove, as we have long believed, that they are guided by something more than instinct, and that they really reason and reflect. We agree with him in his remarks about people knowing nothing about dogs who only keep them for show, and that a dog is much more than "a collection of points," which certainly can be easily transferred from one person to another, but it is not so easy to transfer the best working qualities of a really good animal to a man who does not understand him, for these qualities in the highest development depend on the interest the dog takes in sport in association with the man who teaches him to employ his faculties in a pursuit which affords mutual pleasure. The author believes that there is a moral sense in dogs, but not in cats; his evidence and his anecdotes go far to support the theory. We heartily commend a perusal of this book, which is illustrated by Mr. J. T. Nettleship, Mr. C. E. Brittain, and Mr. T. W. Wood.

The sage districts of California are noted for producing the finest honey in the world, and we do not believe that any place in the State has larger fields of this plant than the Lompor Valley. I do not, of course, allude to our garden herb (*Salvia officinalis*), but a wild species, which might probably be cultivated by bee-keepers in this country. The splendid sage of Mexico is known to us chiefly as a green-house plant, although it will grow in the open border, where its large spikes of scarlet flowers are very striking, but the Californian kind is much smaller (I am unacquainted with its botanical name). Bees are very partial to it, as they likewise are to the figwort, there commonly called "Simson honey plant," and manezanita; but the willows all along the Santa Ynes produce the early honey, for they bloom in February, and the insects will fly for miles in order to get at their flowers. Californian bees will work splendidly during the season. A good swarm puts in combs from five to ten pounds of choice white honey per day, but then they are well pastured, fed and watered. The bee-keepers always select a very sheltered spot for their apiaries, taking as much care as they can that no long, open space should intervene between the hives and the pasture grounds, for if the insects laden with honey meet a cold "norther" in returning home they get chilled and perish by thousands. You have probably noticed that when bees leave the hive they always fly high; they are light, and can rise on the wing easily, but when returning, if well laden, their weight is doubled, consequently it is wise to plant your bee flowers considerably above the elevation of your apiary, as it is a great assistance to the workers to start for home at a hundred feet or so higher than the hives, and Californians study this point in their bee-farming. They also cultivate a great number of plants which flower in autumn, so as to have second-class honey for winter stores.

To make Skeleton Leaves.—This is a matter that may have some interest for our lady readers. Cherry, pear, poplar, ivy, holly, or maple leaves should be gathered in June or July, when the young leaves are at their full growth; placed in a pan (an earthen one) of rain water, be kept filled up as it wastes, but none of the water should be emptied out. Some of the leaves will be ready to dissect in a month, and some in not less than two. When the external membranes begin to separate, then is the time to begin the operation. The leaf should be put in a flat white plate with clear water. Then the leaf should be gently squeezed with the finger, and it will open on one side and the green juice will press out; then the two outward skins must be stripped off, first in the middle and along the sides, where they closely adhere, and if an opening be made they will easily come off; then the skeleton should be washed in clean water, and put to dry between leaves of paper. Pear and holly leaves have a double set of fibres that must be separated with circumspection. One set of fibres is more perfect than the other.

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The Secretaries of the various scientific societies are particularly requested to forward on as early a date as possible, reports of their meetings, so as they may be published in the next issue.

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